

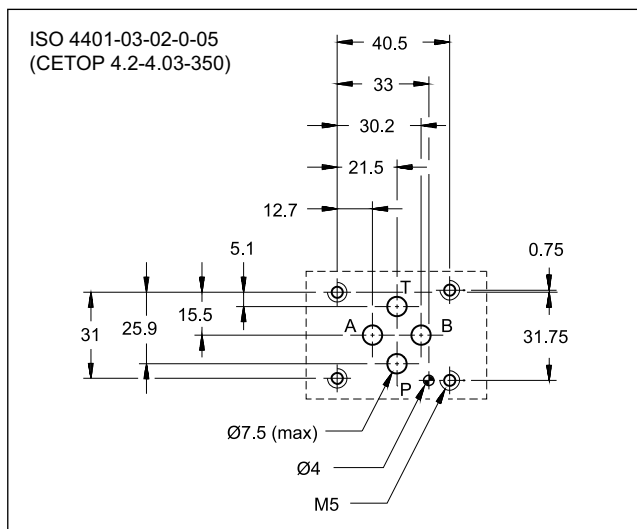
DXE3J

HIGH RESPONSE SERVO-PROPORTIONAL VALVE WITH FEEDBACK AND INTEGRATED ELECTRONICS SERIES 31

**SUBPLATE MOUNTING
ISO 4401-03**

**p max 350 bar
Q max 70 l/min**

MOUNTING INTERFACE

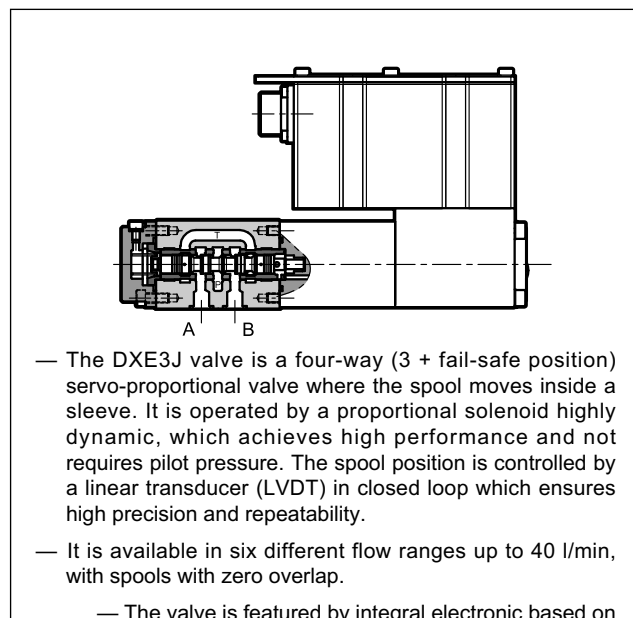


PERFORMANCES

(with mineral oil of viscosity 36 cSt at 50°C)

Maximum operating pressure Ports P - A - B Port T	bar	350 250
Rated flow Q nom (with Δp 70 bar P - T)	l/min	1 - 2 - 5 - 10 - 20 - 40
Hysteresis	% In	< 0.2
Threshold	% In	< 0.1
Thermal drift (with $\Delta T = 40$ °C)	% In	< 1.0
Response time (0-100%)	ms	≤ 10
Vibration on the three axes	g	30
Ambient temperature range	°C	-20 / +60
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	5 + 400
Fluid contamination degree	according to ISO 4406:1999 class 17/15/12 (16/14/11 for longer life)	
Recommended viscosity	cSt	25
Mass	kg	2.6

OPERATING PRINCIPLE

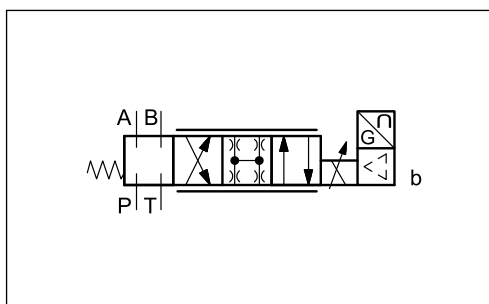


— The valve is featured by integral electronic based on SMD technology which ensures standard regulations and simplifies the electric wiring. The unit doesn't require any adjustment other than the possible electronic regulation of the zero.

— Two types of integrated electronics are available, with analogue or fieldbus interfaces.

— Suitable for control applications with closed loop of position, velocity and pressure. With a power down or without the enable input, the spool moves itself at fail-safe position.

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODE

1.1 - Standard electronics

D	X	E	3	J	-	LZ			/	31	-	K11	
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Servo-proportional valve with spool in sleeve

Electric proportional control

Size ISO 4401-03

Standard electronics for closed loop

Spool with linear flowrate curve and zero overlap, low leakage

Rated flow (with $\Delta p = 70 \text{ bar P - T}$)

01 = 1 l/min	10 = 10 l/min
02 = 2 l/min	20 = 20 l/min
05 = 5 l/min	40 = 40 l/min

Fail safe type

F1 = closed centre
F3 = float
FC = cross centre

Pin C function:
A = external enable
B = internal enable
C = 0V monitor

6 + PE pole connection

Command value:
E0 = voltage $\pm 10 \text{ V}$
E1 = current $4 \pm 20 \text{ mA}$

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Series No.
(from 30 to 39 sizes and mounting dimensions remain unchanged)

1.2 - Available versions

leakage flow in fail safe position at 100 bar [cm ³ /min]	
F1	P → A 20
	P → B 30
	A → T 30
	B → T 30
F3	P → A 20
	P → B 30

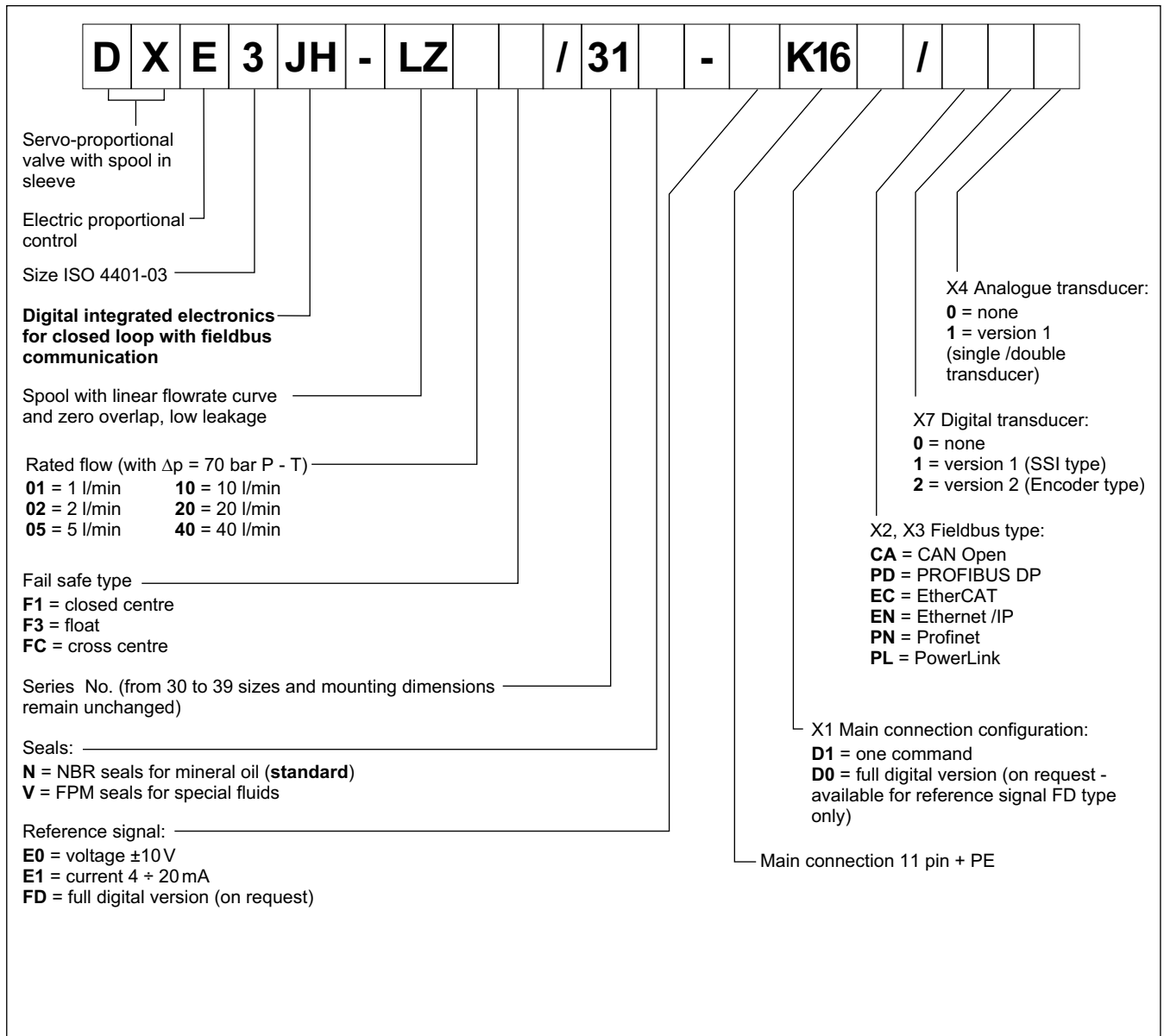
flow rate	fail safe type		
	F1	F3	FC
01	■	-	-
02	■	-	-
05	■	■	-
10	■	■	-
20	■	■	■
40	■	■	■

■ available - not available

FAIL SAFE POSITION

When a power failure occurs, the electronics de-energizes the solenoid and the spool will take the fail safe position by spring return.

1.3 - Electronics with fieldbus communication



2 - ELECTRONICS COMMON DATA

Duty cycle		100% (continuous operation)
Protection class according to EN 60529		IP65 / IP67
Supply voltage	V DC	24 (from 19 to 30 VDC), ripple max 3 Vpp
Power consumption	VA	35
Maximum solenoid current	A	2.6
Fuse protection, external	A	(fast), max current 4A
Managed breakdowns		Overload and electronics overheating, LVDT sensor error, cable breakdown, supply voltage failures
Electromagnetic compatibility (EMC) emissions EN 61000-6-4, immunity EN 61000-6-2		According to 2014/30/EU standards

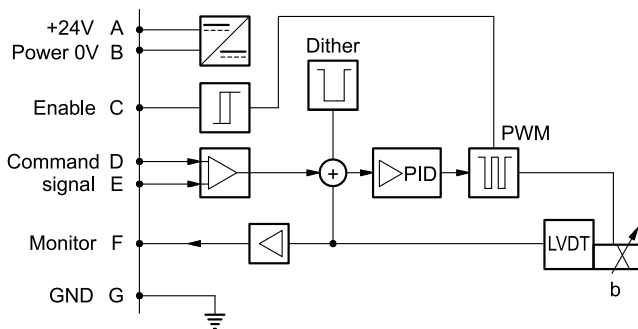
3 - DXE3J - STANDARD ELECTRONICS

3.1 - Electrical characteristics

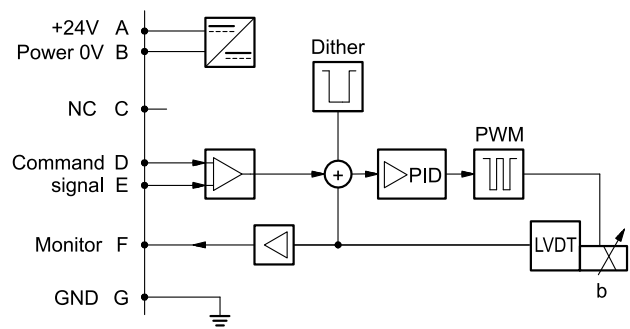
Command signal:	voltage (E0) current (E1)	V DC mA	± 10 (Impedance $R_i = 11 \text{ k}\Omega$) $4 \div 20$ (Impedance $R_i = 58 \text{ }\Omega$)
Monitor signal (current to solenoid):	voltage (E0) current (E1)	V DC mA	± 10 (Impedance $R_o > 1 \text{ k}\Omega$) $4 \div 20$ (Impedance $R_o = 500 \text{ }\Omega$)
Communication for diagnostic			LIN-bus Interface (by means of the optional kit)
Connection			6 pin + PE (MIL-C-5015-G - DIN EN 175201-804)

3.2 - On-board electronics diagrams

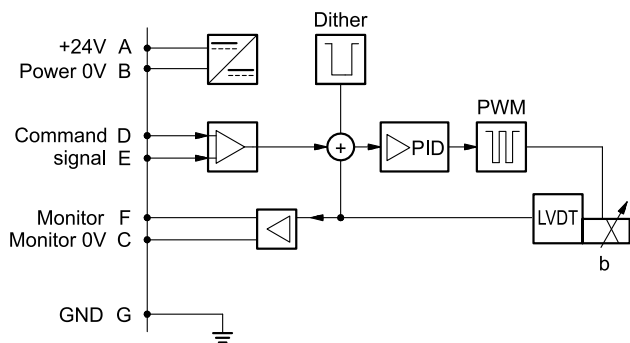
VERSION A - External Enable



VERSION B - Internal Enable

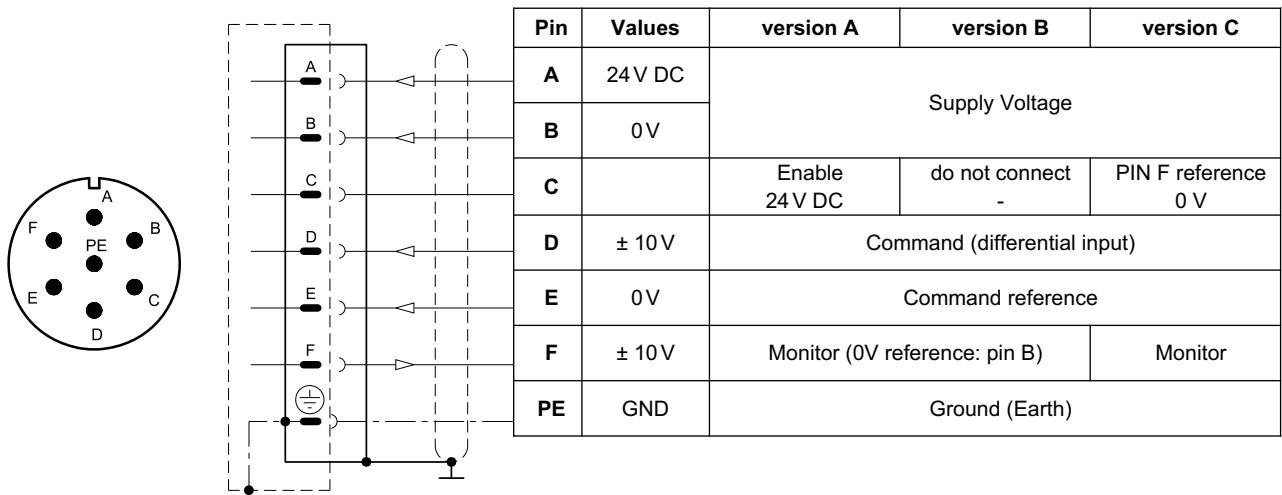
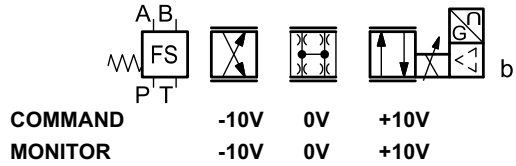


VERSION C - 0V Monitor



3.3 Version with voltage command (E0)

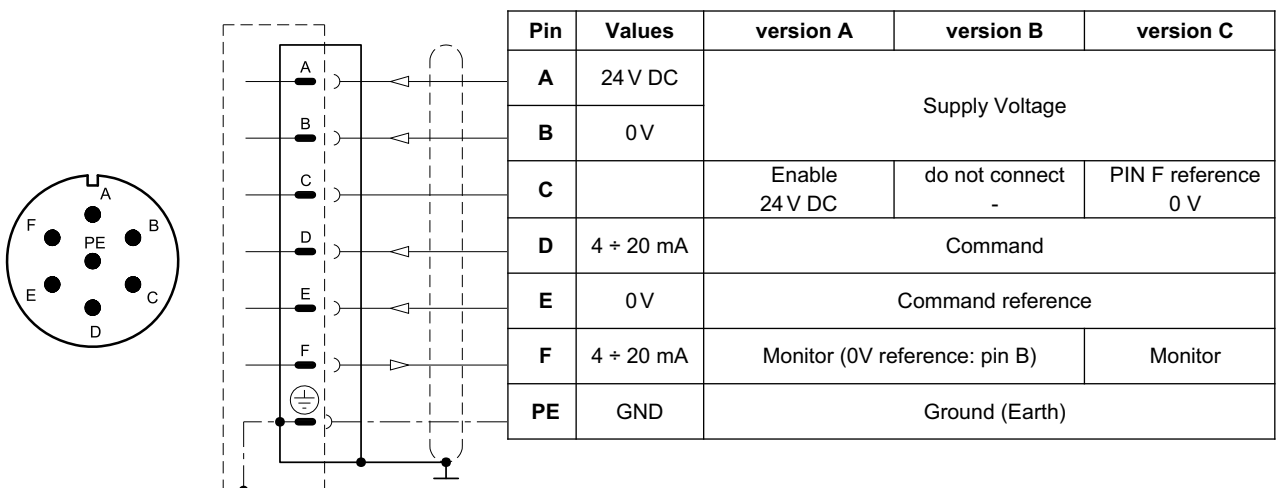
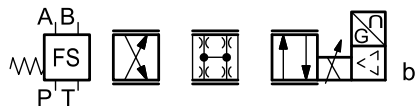
The reference signal must be between -10V and +10V. The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



3.4 - Versions with current command (E1)

The reference signal is supplied in current 4 ± 20 mA. If the current for command is lower, the card shows a breakdown cable error. To reset the error is sufficient to restore the signal.

The monitor feature of versions B and C becomes available with a delay of 0,5 sec from the power-on of the card.



4 - DXE3JH - FIELD BUS ELECTRONICS

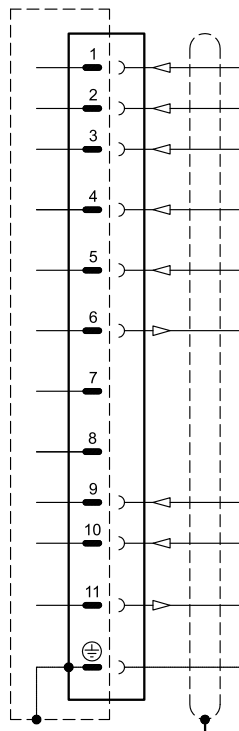
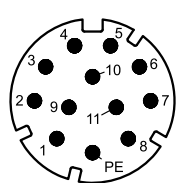
The 11+ PE pin connection allows separate supply voltage for electronics and solenoids.

Command - valve position schemes as for the standard electronics. Please refer to pictures in par. 3.3 and 3.4.

4.1 - Electrical characteristics

Command signal:	voltage (E0) current (E1) digital (FD)	V DC mA	±10 (Impedance Ri = 11 kOhm) 4 ÷ 20 (Impedance Ri = 58 Ohm) via fieldbus
Monitor signal (current to solenoid):	voltage (E0) current (E1)	V DC mA	±10 (Impedance Ro > 1 kOhm) 4 ÷ 20 (Impedance Ro = 500 Ohm)
Communication / diagnostic			via Bus register
Communication interface standards	CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		EN 50325-4 + DS408 EN 50170-2 / IEC 61158 IEC 61158
Communication physical layer	CAN Open PROFIBUS DP EtherCAT, Ethernet /IP, Profinet, PowerLink		optical insulated CAN ISO 11898 optical insulated RS485 fast ethernet, insulated 100 Base TX
Power connection			11 pin + PE (DIN 43651)

4.2 - X1 Main connection pin table



D1: one command

Pin	Values	Function
1	24V DC	Main supply voltage
2	0V	
3	24V DC	Enable
4	± 10V (E0) 4 ÷ 20 (E1)	Command
5	0V	Command reference signal
6	± 10V (E0) 4 ÷ 20 (E1)	Monitor (0V reference pin 10)
7	NC	do not connect
8	NC	do not connect
9	24V DC	Logic and control supply
10	0V	
11	24V DC	Fault (0V DC) or normal working (24V DC) (0V reference pin 2)
12	GND	Ground (Earth)

D0: full digital

Pin	Values	Function
1	24V DC	Main supply voltage
2	0V	
3	24V DC	Enable
4	NC	do not connect
5	NC	do not connect
6	NC	do not connect
7	NC	do not connect
8	NC	do not connect
9	24V DC	Logic and control supply
10	0V	
11	24V DC	Fault (0V DC) or normal working (24V DC) (0V ref. pin 2)
12	GND	Ground (Earth)

4.3 - FIELDBUS connections

Please wire following guidelines provided by the relative standards communication protocol.

4.3.1 - Communication connection CA (CAN Open)

X2 (IN) connection: M12 A 5 pin female



Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

X3 (OUT) connection: M12 A 5 pin male



Pin	Values	Function
1	CAN_SH	Shield
2	NC	Do not connect
3	GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

4.3.2 - Communication connection PD (PROFIBUS DP)

X2 (IN) connection: M12 B 5 pin male (IN)



Pin	Values	Function
1	+5V	Termination supply signal
2	PB_A	Bus line (high)
3	0V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

X3 (OUT) connection: M12 B 5 pin female



Pin	Values	Function
1	+5V	Termination supply signal
2	PB_A	Bus line (high)
3	0V	Data line and termination signal 0
4	PB_B	Bus line (low)
5	SHIELD	

4.3.3 - Communication connections: EC (EtherCat), EN (Ethernet/IP), PN (PROFINET), PL (POWERLINK)

X2 (IN) connection: M12 D 4 pin female



Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

X3 (OUT) connection: M12 D 4 pin female



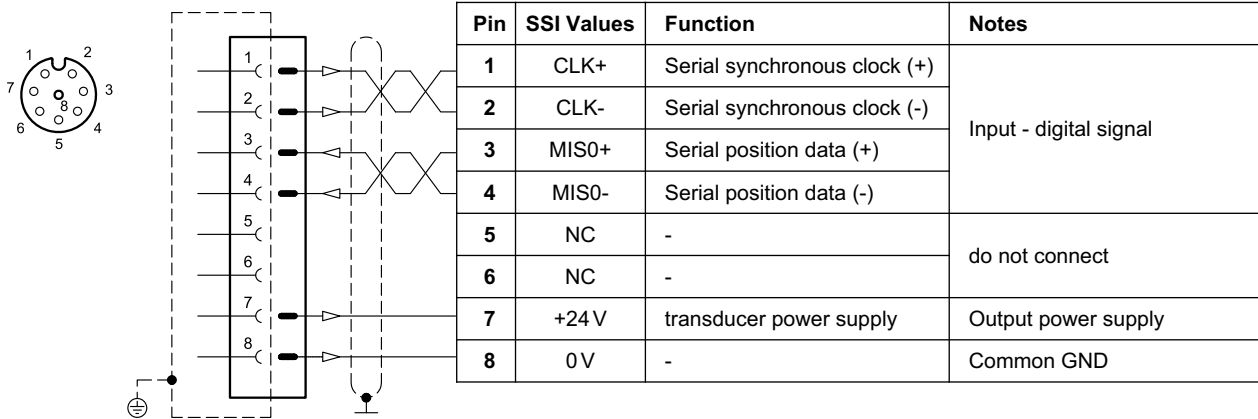
Pin	Values	Function
1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
HOUSING	shield	

NOTE: Shield connection on connector housing is recommended.

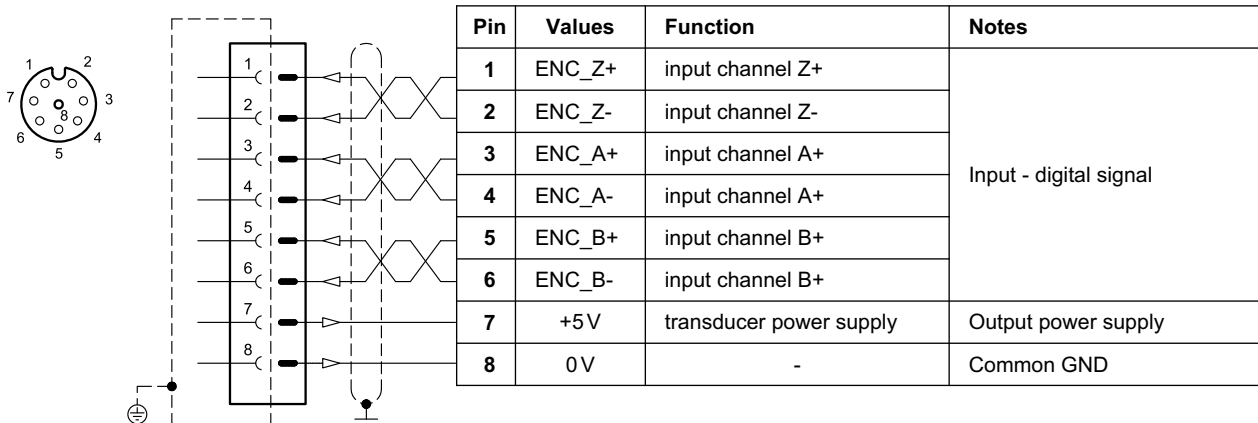
4.4 - Digital transducer connection

X7 connection: M12 A 8 pin female

VERSION 1: SSI type



VERSION 2: ENCODER type

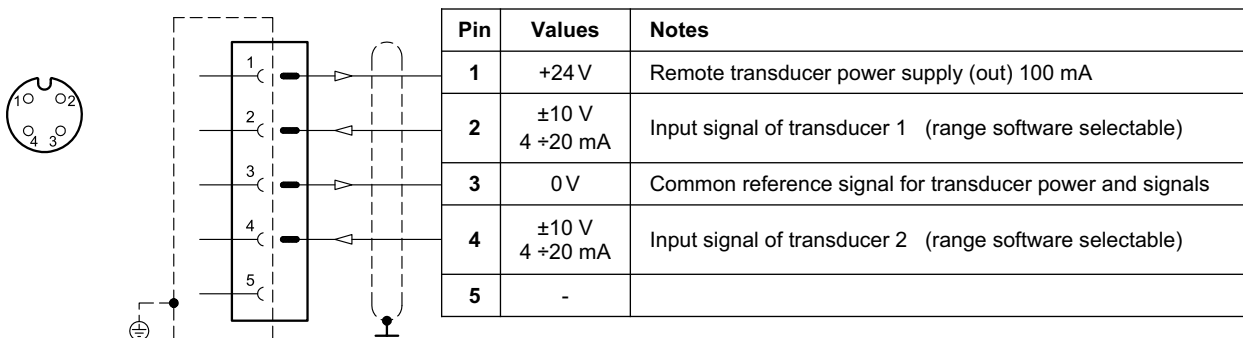


4.5 - Analogue transducer connection

X4 connection: M12 A 4 pin female

VERSION 1: single / double transducer

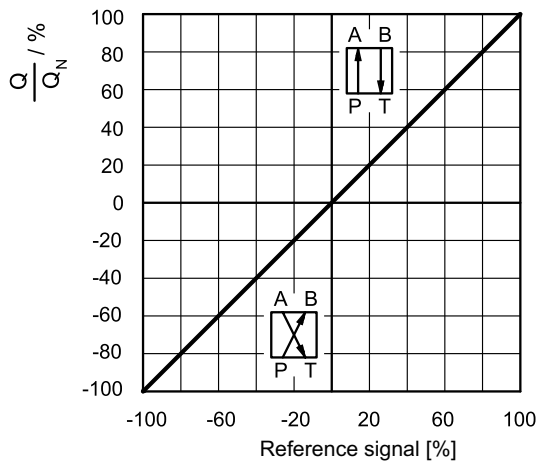
(single or double is a software-selectable option)



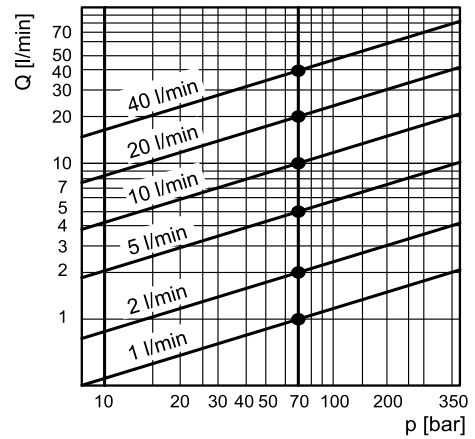
5 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C)

REFERENCE / FLOW RATE CURVE



FLOW RATE CURVE ACCORDING TO Δp

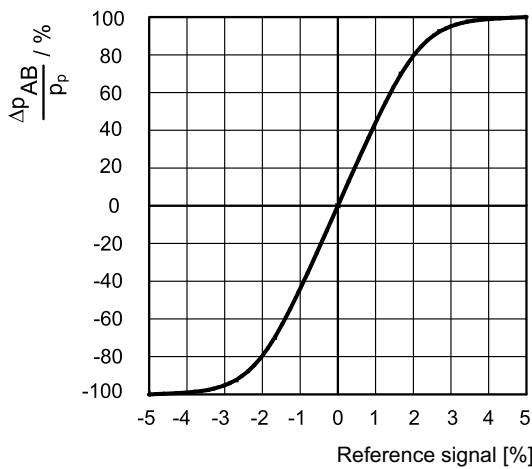


Typical flow rate curves at constant $\Delta p = 70$ bar P-T according to the reference signal.

NOTE: with positive reference signal connected to pin D the valve regulates P - A / B - T.

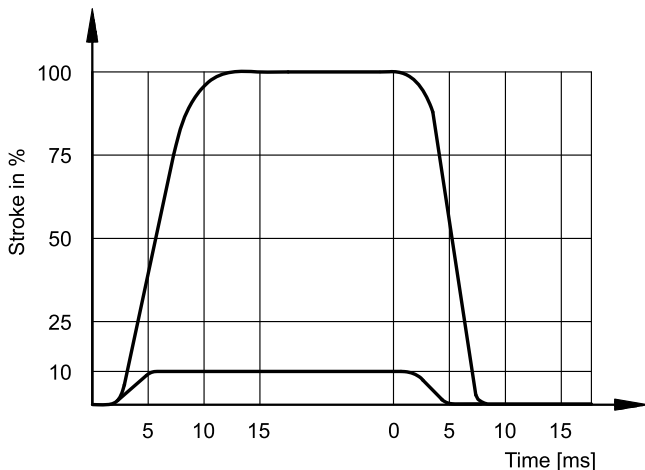
The diagram states the maximum valve controlled flow rate according to the pressure drop between the P and T ports.

PRESSURE GAIN

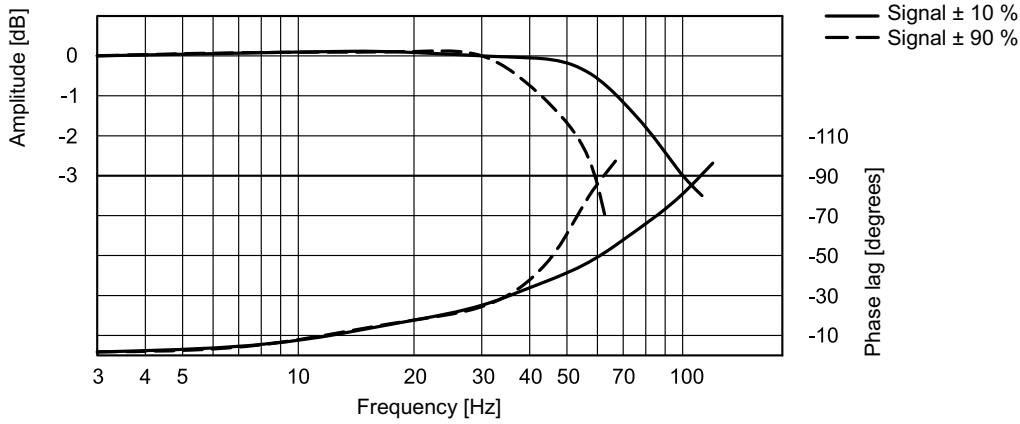


The diagram shows the valve pressure gain, expressed as % of the ratio between the port pressure variation in A or B (Δp_{AB}) and the P system pressure, according to the reference signal. In practice, the pressure gain states the valve reaction towards external disturbances aimed at changing the actuator position.

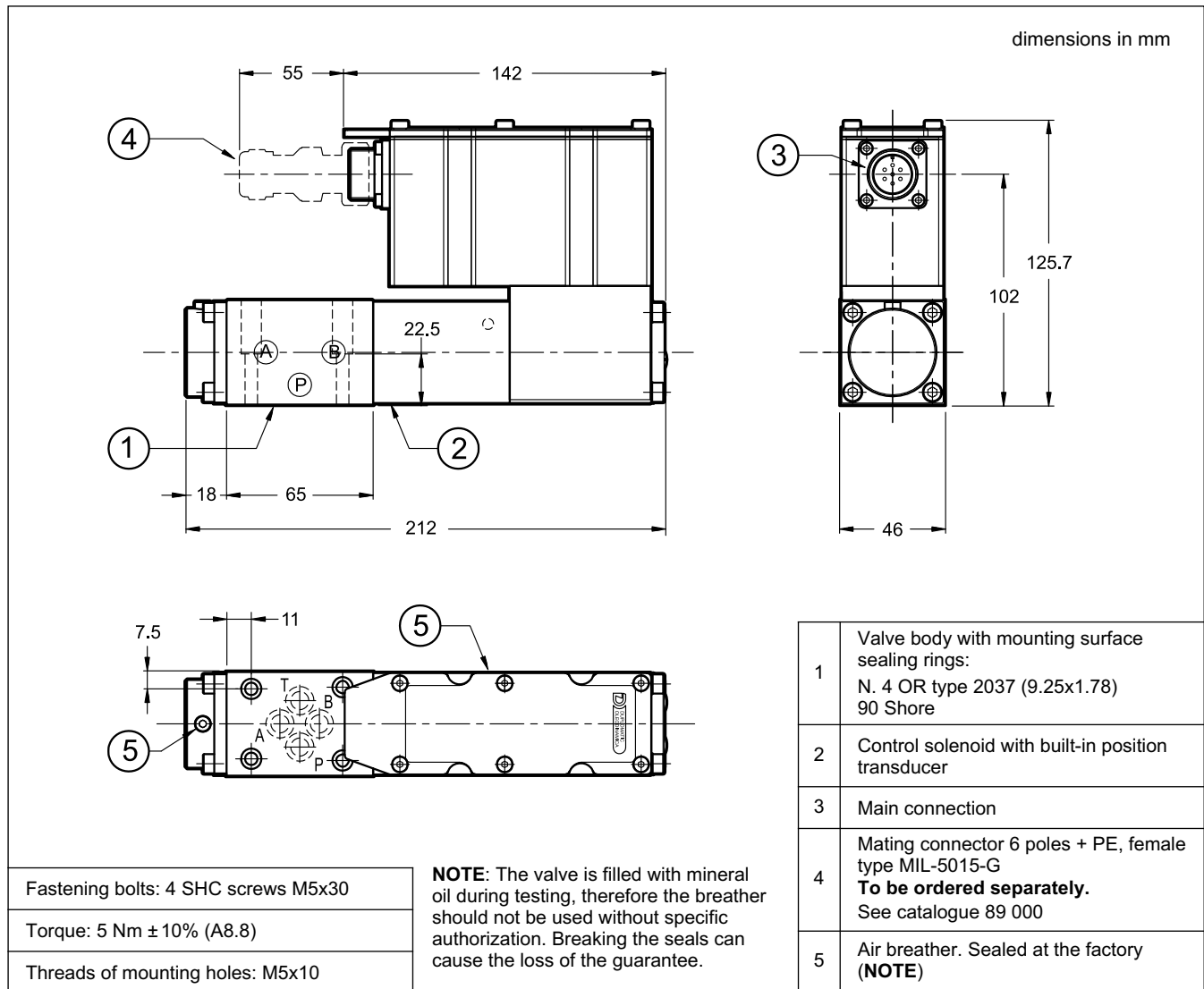
RESPONSE TIME



FREQUENCY RESPONSE

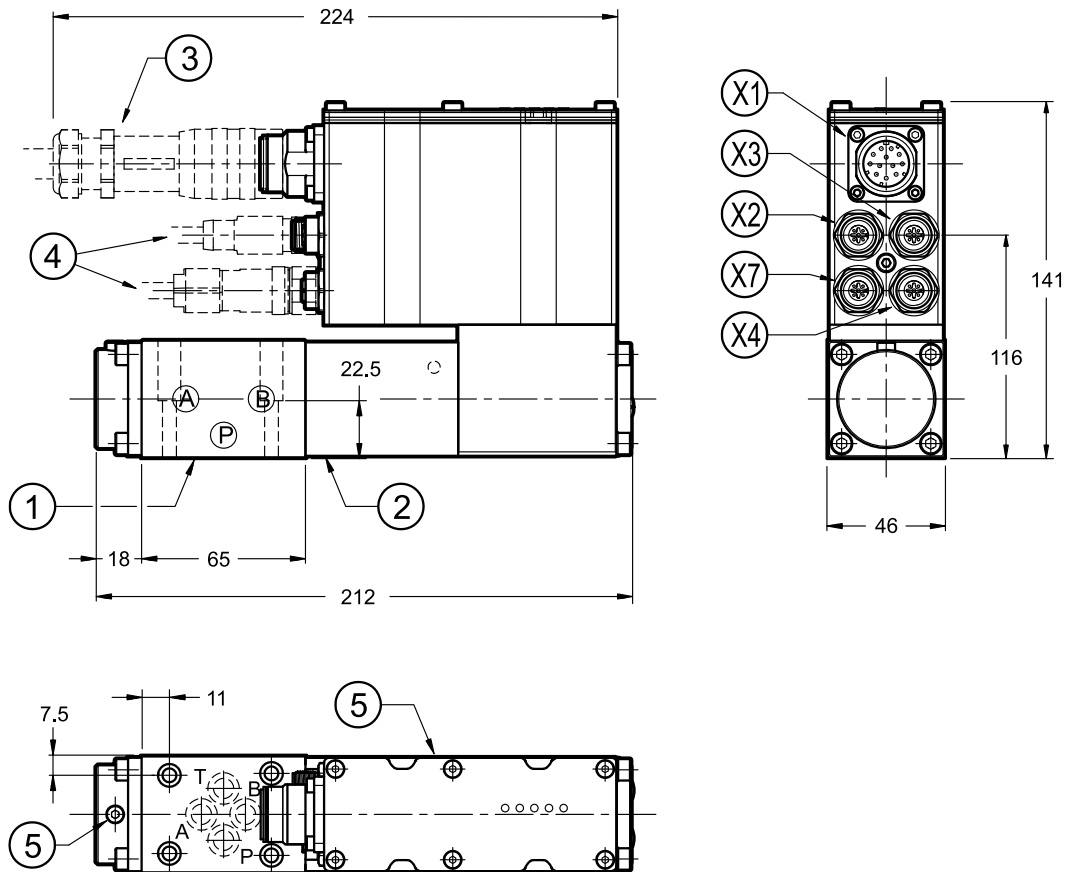


6 - DXE3J - OVERALL AND MOUNTING DIMENSIONS



7 - DXE3JH - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm



X1	Main connection 11 pin + PE
X2	Fieldbus communication (IN)
X3	Fieldbus communication (OUT)
X4	X4 connection for analogue transducer
X7	X7 connection for digital transducer

1	Mounting surface with sealing rings: N. 4 OR type 2037 (9.25x1.78) 90 Shore
2	Control solenoid with built-in position transducer
3	Mating connector 11 poles + PE To be ordered separately. See catalogue 89 000
4	Mating connectors for fieldbus communication and signals To be ordered separately. See catalogue 89 000
5	Air breather. Sealed at the factory (NOTE 2)

NOTE 1: Depending on the chosen version, X4 and X7 connections may not be present.
Please refer to section 5 for connection descriptions and pinout.

NOTE 2: The valve is filled with mineral oil during testing, therefore the breather should not be used without specific authorization. Breaking the seals can cause the loss of the guarantee.

Fastening bolts: 4 SHC screws M5x30

Torque: 5 Nm ± 10% (A8.8)

Threads of mounting holes: M5x10

8 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

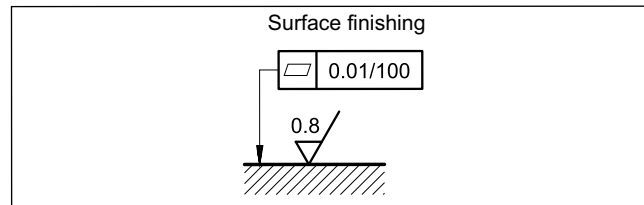
The fluid must be preserved in its physical and chemical characteristics.

9 - INSTALLATION

The valves can be installed in any position without impairing correct operation. Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols.

If minimum values are not observed, fluid can easily leak between the valve and support surface.

Take care to the cleanliness of the mounting surfaces and surrounding environment upon installation.



10 - ACCESSORIES

(to be ordered separately)

10.1 - Mating connectors

Mating connectors must be ordered separately. See catalogue 89 000.



For K11 and K16 versions we recommend the choice of a metal connector to avoid electromagnetic disturbances and to comply with EMC regulations on electromagnetic compatibility. If you opt for a plastic connector, make sure that it guarantees and maintains the IP and EMC protection characteristics of the valve.

10.2 - Mating connectors for fieldbus communication and for sensors.

Duplomatic offers spare parts to be wired and also ready-to-use cord sets. Please refer to cat. 89 000.

10.3 - Connection cable

The optimal wiring provides for 7 isolated conductors, with separate screen for the signal wires (command, monitor) and an overall screen.

Cross section for power supply:

- up to 20 m cable length : 1,0 mm²
- up to 40 m cable length : 1,5 mm² (IO-Link excluded)

Cross section for signals (command, monitor):

- 0,50 mm²

10.4 - Kit for start-up LINPC-USB

Device for service start-up and diagnostic, available for valves with K11 and K16 connections. See catalogue 89 850.

11 - SUBPLATES

(see catalogue 51 000)

PMMD-AI3G rear ports
PMMD-AL3G side ports
Ports dimensions: P, T, A, B: 3/8" BSP